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THE PLACE OF RESEARCH IN PLANNED CHANGE. CHAPTER 5, CHANGE PROCESSES IN THE PUBLIC SCHOOLS.

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THE NATURE, METHOD, AND TIMING OF EDUCATIONAL CHANGE REQUIRE RELIABLE KNOWLEDGE WHICH CANNOT BE SUPPLIED BY APPEAL TO THE SUPERNATURAL, WORLDLY AUTHORITY, INTUITION, COMMON SENSE, OR PURE LOGIC. THE SCIENTIFIC METHOD WITH ITS GATHERING OF FACTS AND ANALYSIS BY INDUCTION IS A MORE RELIABLE BASIS FOR DECISIONMAKING. FEW TEACHERS UNDERSTAND THE NATURE OF RESEARCH OR ITS RELATION TO SOUND EDUCATIONAL PLANNING, AND THE VALUE OF THEORY IS FREQUENTLY CONFUSED WITH MERE SPECULATION. MUCH EDUCATIONAL RESEARCH IS INFERIOR, REDUNDANT, AND UNSOPHISTICATED BOTH IN CONCEPT AND DESIGN, AND NEEDS TO MOVE FROM LEVELS OF RANDOM OBSERVATION AND SYSTEMATIC EXPLORATIONS OF BROAD FIELDS TO THE TESTING OF WELL-DEFINED BUT ISOLATED HYPOTHESES AND RESEARCH DIRECTED BY SYSTEMATIC AND INTEGRATED THEORY. THE COMPLETE DOCUMENT, "CHANGE PROCESSES IN THE PUBLIC SCHOOLS," IS AVAILABLE FROM THE CENTER FOR THE ADVANCED STUDY OF EDUCATIONAL ADMINISTRATION, UNIVERSITY OF OREGON, EUGENE, OREGON 97403, FOR $2.00. (HM)

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Change Processes in the Public Schools

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Change Processes in the Public Schools

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Foreword

Organizations have careers in much the same sense that individuals have careers. In the tracing out of organizational careers, a number of changes can always be detected, even among the seemingly most stable organizations.

Change in organizations comes about in many ways. Some changes occur with the size of the organization and some changes occur with the maturation process. Also, organizational change results, sometimes dramatically but most often not, from the succession of people through key offices. Similarly, a kind of evolutionary change in organizations can be seen as they adapt to forces within or conditions of their environments. To some extent, changes of this order can be called "organizational drift" because they frequently go unnoticed by those who direct the affairs of an organization. The effect of these rather gradual changes are almost imperceptibly viewed over a short time span but sometimes loom large when the overall career of the organization is considered.

In addition to organizational change that might be characterized as drift, change comes about in organizations by design or deliberate plan. Being seemingly "self" conscious about ends to be achieved and means of achieving ends, organizations strive for survival, if not perfection, and seem constantly to be proposing and carrying out change plans. It is this latter type of change, *planned change*, which is treated in this publication.

This publication is a report of a seminar conducted with public school officials by the Center for the Advanced Study of Educational Administration at the University of Oregon. The seminar, considered a pilot venture, had as its main objective the enhancement of the school officials' understanding of the planned change processes and of their skills in carrying out planned change. In formulating the design of the seminar we were aided by members of the Committee on Inservice Education of the Oregon Association of Schoo! Administrators. Some changes in the order and nature of events were made while the seminar was in progress; these changes resulted from the almost continuous conversation with the consultants and other interested persons on the question, "How are things going?"

The seminar, held in Portland, Oregon in October, 1964, revolved

around two major elements: (1) small group discussions of papers prepared for the seminar by four consulting social scientists, and (2) what were termed "clinic sessions." These sessions brought the school officials and the social scientists together in small groups where attention was given to specific change problems that had been, and were being encountered by the school officials. In advance of the clinic sessions, the school officials prepared memoranda of their specific problems.

All of the events of the seminar are not reported here, nor does the order of the contents of this publication follow the order of the seminar itself.[1]

The publication includes three of the four papers prepared for the seminar by the consulting social scientists—those by Matthew B. Miles, Art Gallaher, Jr., and Everett M. Rogers. Unfortunately we were unable to secure publication rights to the paper by James Q. Wilson and consequently his work does not appear here. The papers by Richard O. Carlson and Roland J. Pellegrin, although they were read during the seminar, were not part of the grist for the mill in the clinic and discussion sessions. It will be noted that the papers of these latter two contributors present different perspectives on planned change from those contained in the papers by the consultants and in the summaries of the group discussions.

The final section of this publication is a summary of the seminar itself which was made by Donald E. Tope at its concluding session.

Some financial aid for the seminar was provided by the National Institute of Mental Health of the Department of Health, Education, and Welfare. Our indebtedness extends also to the University Council for Educational Administration for the aid which was provided through its Executive Director, Jack Culbertson. Although they are unnamed here, many persons contributed a variety of talents to the task of the seminar and their efforts are gratefully acknowledged.

RICHARD O. CARLSON
KEITH GOLDHAMMER
Seminar Coordinators

February, 1965
UNIVERSITY OF OREGON, Eugene, Oregon

[1] Although absent from this publication, a discussion of *The Jackson County Story* was included in the seminar. This case study exists in published form and may be obtained from the Center for the Advanced Study of Educational Administration, University of Oregon. (*The Jackson County Story, A Case Study*, by Keith Goldhammer and Frank Farner. University of Oregon, Center for the Advanced Study of Educational Administration, 1964.)

Contents

Foreword v

1

Barriers to Change in Public Schools RICHARD O. CARLSON 3

2

Planned Change and Organizational Health: Figure and Ground MATTHEW B. MILES 11

3

Directed Change in Formal Organizations: The School System ART GALLAHER, JR. 37

4

What Are Innovators Like? EVERETT M. ROGERS 55

5

The Place of Research in Planned Change ROLAND J. PELLEGRIN 65

6

Seminar on *Change Processes in the Public Schools*

A. SUMMARIES OF GROUP DISCUSSIONS 79

B. SUMMARY OF SEMINAR 89

5

The Place of Research in Planned Change

By
ROLAND J. PELLEGRIN

EA 000 718

The Place of Research in Planned Change

ROLAND J. PELLEGRIN
University of Oregon

THE TIMES in which we live have been aptly characterized as an era of change. We are confronted today with a world in which rapid changes, far-reaching in scope and significance, impose stresses and strains upon established institutions. In our own society, certain major social trends are forging a social structure radically different from that which existed but a few decades ago. All institutional segments of the society are feeling the impact of these forces. The educational segment is feeling their effects as much as any other.

Education is, in fact, besieged with pressures for change both by external and internal forces. Externally, social conditions and trends call for changes within the field of education. Prominent among these are such diverse matters as automation, technologically induced unemployment, the development of an economy resting on a highly differentiated and specialized division of labor, urbanization, the exploding rate of discovery in many fields of knowledge, the emergence of disadvantaged and alienated segments of the population, and the use of knowledge as a weapon in international struggles. These developments (and others) demand adaptive changes in educational organization and practice.

Within the field of education there are also many pressures for change. There is widespread recognition among educators that there are notable deficiencies and limitations in the content, organization, and administration of the curriculum. At the same time, there has arisen a higher level of aspiration, a feeling that education can increase its contributions to the welfare of society. There is, in short, a belief that changes in education are necessary and desirable, as well as inevitable. But this is but a first step toward coping with the problem of change. There remain serious and complex problems concerning the nature of the changes that should be introduced, the method and timing of their introduction, and so on. In order to cope with such problems, we need much reliable knowledge we do not presently have. How shall we get it?

The Search for Reliable Knowledge

In seeking answers to this question, it is appropriate that we begin by looking at the various approaches man has developed through the ages in order to "solve" his problems of existence. Man has always had to adapt minimally to his environment; he has always had to cope with uncertainties; he has always been faced with a host of major and minor problems. In other words, man has forever been plagued with the need for knowledge, with the need for controlling his environment.

As we know, he has responded to these needs in a number of ways, developing a variety of approaches to meet the questions and uncertainties that have continually confronted him. We may describe these as follows:[1]

1. *Appeal to the Supernatural.* In our thinking, we usually associate this approach to problem-solving with ancient or primitive peoples. It is true that in our "rational age" few of us seek to analyze, comprehend, and manipulate mystical forces in order to solve our secular problems. Other aspects of this approach remain quite common, however. For example, it is widely assumed that much about what is called "human nature" does not conform to natural laws and is not susceptible to rational analysis. Such thinking views many human problems as insolvable through rational efforts, and relies on faith for amelioration of conditions. Also associated with this approach is an attitude of resignation in the face of problems sometimes accompanied by a hope that if nothing is done the problems will somehow take care of themselves.

2. *Appeal to Worldly Authority.* This approach, of course, relies heavily on tradition, custom, and habitual ways of doing things. Policies and practices are justified on the basis of longevity and persistence, the assumption being made that if something has endured there is good reason to continue it. The approach has many facets. One which remains in common use, for example, is the justification of a practice because it was recommended by a person of high prestige.

3. *Intuition.* This approach assumes that some persons are especially competent to render sound judgments because they are gifted with talent for insight. Intuition is a mysterious process, unclearly related to rational or sensory analysis. The approach is often indistinguishable from the first one we discussed.

4. *Common Sense.* The alleged ability of the individual to reach sound conclusions on the basis of his reasoning capacity and his experience forms the groundwork for this approach. It assumes that the

[1] The following classification is found in Stuart Chase, *The Proper Study of Mankind* (Rev. Ed.). New York: Harper and Brothers, 1956, p. 3.

combination of reasoning powers and personal experiences provides sufficient guidelines for action.

5. *Pure Logic*. Of all approaches, this one places the greatest reliance on human faculties as a basis for decision-making. It emphasizes the use of logical reasoning and rational analysis; its primary method is deduction. Reliable knowledge is viewed as the product of logical analysis.

6. *The Scientific Method*. In brief, this approach rests upon the gathering of facts and their analysis by means of induction. It is the only approach that emphasizes the systematic collection of empirical data as the foundation for principles and theory. It is, I believe, the only approach that can provide us with a high probability of success in our search for reliable knowledge. Later on, I shall discuss in some detail the nature of this approach and what we can expect of it. For the moment, however, let me make a few remarks about the other five approaches.

All have a common failing—the percentage of error is quite high. They are but rough guides. While any of these approaches may at times lead to sound conclusions, each is also a road to serious mistakes. None provides a means for checking findings that is based on observed fact.

Each of these approaches can easily be subjected to devastating analysis to demonstrate its deficiencies and inadequacies as a basis for decision-making. I will spare you a detailed analysis, and will content myself with a few comments about one of these approaches, common sense.

As an approach to problem solving, common sense is deficient for a number of reasons. For one thing, the experience of the individual is limited; for another, reasoning ability varies considerably from one person to another. Even more important, however, is the fact that the exercise of common sense suffers from procedural, empirical, and theoretical inadequacies. Stuart Chase had the following comments to make on this subject:

> Eddington, in a famous passage in *Space, Time and Gravitation*, has shown the limitations of common sense. What nonsense, he says, to think that the table on which one writes is a collection of electrons moving with prodigious speed in spaces relatively as empty as the spaces between the planets in the solar system! What nonsense to believe that this thin air presses on every square inch of one's body with a 14-pound weight. What nonsense to think that the light one sees in the eyepiece of this telescope left a star 50,000 years ago.
>
> Common sense tells us that the world is flat, that the sun goes around the earth, that heavy bodies always fall faster than light bodies, that boats made of iron will sink. The practical man, that

> paragon of common sense, was once defined by Disraeli as "one who repeats the errors of his forefathers."[2]

In virtually all spheres of activity, we attempt to solve our problems by falling back on common sense and other defective approaches. This is no less true of education than of most other fields of endeavor. Let us now turn our attention to the bases for decisions, problem-solving, and changes in education.

The Bases for Educational Policy and Practice

On what bases do judgments rest in education? What is the rationale underlying existing policies and practices? To what extent do innovations rest on a foundation of reliable knowledge?

In pondering these questions, we cannot fail to be impressed with the extent to which reliance on authority (tradition) is used to justify existing policies and practices, and the extent to which common sense and intuition are used as springboards for innovation. Haskew, in a discussion of approaches to educational improvement, said:

> One traditional answer has been to get as many people as possible to use rational judgment, as best they can, to agree upon (a) what is desirable and (b) what will be likely to bring about the desirable. Another traditional answer is to produce hypotheses of what might be better and to test those hypotheses in some context of evaluative control. A third approach is to investigate and record and then to deduce; deductions may become the basis of planned and directed progress or they merely become subject matter.[3]

All in all, Haskew's evaluation of the foundations of policy and practice is rather charitable. Griffiths, speaking specifically of the field of educational administration, is somewhat caustic in his remarks. "Much of what is now taught," he says, "is composed of the testimonials of successful administrators, the folklore which has accumulated over time, and an odd assortment of 'promising practices.' "[4]

If we continue to focus attention specifically on the field of educational administration, we see that in the intellectual atmosphere that prevails, described by Griffiths as "value bound" and "practice oriented,"[5] a great deal of policy and practice rests on a foundation consisting mainly of ideology and dogma. Hills, in discussing this fact, has

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[2] *Ibid.*, p. 4.

[3] Lawrence D. Haskew, "A Projective Appraisal," in Daniel E. Griffiths (Ed.), *Behavioral Science and Educational Administration.* The Sixty-third Yearbook of the National Society for the Study of Education, Part II. Chicago: The National Society for the Study of Education, 1964, p. 337.

[4] Daniel E. Griffiths, *Research in Educational Administration: An Appraisal and a Plan.* New York: Bureau of Publications, Teachers College, Columbia University, 1959, p. 5.

[5] *Ibid.*, p. 12.

said that "It seems quite clear that much of what passes for 'good practice' . . . may . . . be considered within the framework of ideology."[6] In substantiating this thesis, Hills asks the reader to examine the following statements, all of which are widely accepted in the field of educational administration. "(1) Experience as a teacher is an essential qualification for an administrator. (2) Schools must be administered democratically. (3) Education must be insulated from politics. (4) School districts must be fiscally independent from municipal governments. (5) Administrators must not fraternize too closely with their subordinates. (6) Administrators must be consistent in their behavior toward teachers. (7) The academically outstanding candidate seldom makes the best classroom teacher. (8) Although he cannot define it, an administrator intuitively knows effective from ineffective teaching. (9) Boards of education should not be organized into standing committees. (10) Established channels of communication must be observed. (11) Males are unsuitable as primary-grade teachers. (12) Males make better administrators than do females. (13) Administrators must back up their teachers in disputes with parents and students, even when the teacher is clearly in the wrong. (14) Primary school children need the security and support provided by having a single teacher for all subjects."[7]

It would be a great exaggeration to say that these statements represent more than agreed-upon assumptions and generalizations. As Hills points out, ". . . these positions are not necessarily wrong. But in most cases, neither is it known that they are right, and that is the essential point. They are, and should be treated as, empirical questions."[8]

Much effort is frequently expended on attempts to achieve goals which are identified through a chain of assumptions resting on a questionable base. One of my favorite examples along these lines is the case of the professionalization movement in education today. Unquestionably, this movement is extremely important in educational circles; in terms of scope and emphasis, it ranks among the most significant recent developments in the field of public education. "Professionalism" among educators is a rallying cry, a symbol of solidarity, and an indicator of attempts to "uplift" the educational enterprise and teaching as an occupation. The term is used to distinguish the dedicated educator from the dilettante, the up-to-date teacher from his dated counterpart, and the loyal educator from the disaffected instructor. The concept of "profession" lies at the heart of current organizational and ideological struggles. Yet there has been almost no empirical study of the functions, meanings, and consequences of these related concepts.

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[6] R. Jean Hills, "Educational Administration at the Crossroads: The Relevance of the Social Sciences to a Changing Field" (unpublished manuscript), p. 7.

[7] *Ibid.*, pp. 7-8.

[8] *Ibid.*, p. 8.

My intention here is not to speak against professionalization, but to call attention to several matters about the movement. If we examine the literature on professionalization in education, we note at once that the concept itself, despite its universal usage, is vague in meaning and that its behavioral implications are uncertain. It is simply assumed—apparently almost universally—that whatever is done under the banner of professionalization is good. The possibility that there might be dysfunctional consequences to the movement as it is being conducted has apparently been given scant consideration, despite the fact that negative consequences have attended efforts at professionalization in other occupations.[9] Not only has the professionalization movement been subjected to little critical analysis; despite the reams of material published on the subject, there has been virtually no empirical research of any sort done on the matter.

Thus, in this case as in many other examples that could be cited, ideology and untested assumption rule the day. Even worse, some current policy and practice owes its existence to hoary clichés and folk wisdom. A single anecdote will suffice to illustrate this point. Some years ago one of my graduate students and I interviewed an official in charge of vocational education programs in his state. In the course of the conversation, he repeatedly deprecated the state of knowledge pertaining to student selection and training. He emphasized that selection procedures were poor and haphazard; that the goals of the curriculum were often left unachieved; and that virtually nothing was known about student aptitudes and motivations. His conclusion was that the only solution to his problems was research—research designed to give answers to key questions. He waxed eloquent on this subject for quite a while, returning again and again to his two major points, namely, that he and his colleagues were floundering in a sea of ignorance, and that research was the beacon light that could guide them ashore. Finally, he said: "About the only thing we know *for sure* is that in a couple of our training programs all students with red hair are going to flunk out." To our astonished queries he replied that he did not know *why* this was so, but only that it *was* so. Some moments later, one of his subordinates was introduced to us as the director of one of the training programs which those cursed with red hair could not survive. This man had red hair! When I pointed this out to our interviewee, he seemed abashed for a moment, as though he had never noticed his subordinate's affliction. But he recovered quickly, leaned back in his chair, and said triumphantly, "Well! I guess he's the exception that proves the rule, isn't he?"

I do not suggest (perish the thought!) that any substantial segment of educational policy and practice rests on so shaky a foundation. The

[9] See, for example, M. Lee Taylor and Roland J. Pellegrin, "Professionalization: Its Functions and Dysfunctions for the Life Insurance Occupation," *Social Forces*, 38 (December, 1959), pp. 110-114.

tale has a moral, however; lacking reliable knowledge, humans will go to any lengths to find a rationale for their actions. The rationale may consist of assumptions and generalizations that *sound* eminently reasonable; it may rest on time-honored practices that extend far into the shadowy past; it may lie firmly embedded in the conventional wisdom of the day. In but relatively few instances, however, does it rest firmly on reliable knowledge.

Scientific Method, Research, and Theory in Education

We now turn attention to how reliable knowledge might be obtained. I see no alternative to empirical research conducted according to the canons of scientific method. In stating this conclusion, however, I recognize that there are tremendous obstacles to overcome before such research can provide the knowledge upon which policy, practice, and innovation in education can rest. The list of these obstacles is long and impressive. Let us take note of some of the principal ones.

Obstacles to Sound Educational Research

1. A major obstacle to research in education is a widespread lack of appreciation for and understanding of the nature and value of research. It can be said with confidence that the general intellectual atmosphere in education is one which gives scant emphasis to the development of a research orientation to one's work, or to the development of a scientific attitude. It goes almost without saying that teachers and administrators rely on precedent and common sense much more than they do on research findings as justifications for their practices. But the problem goes even deeper. There is a common inability to differentiate between fact and opinion. Again and again in reporting research findings to audiences of educators, I have been struck by the fact that many of them equate research findings with opinion and personal experiences—i.e., each of these is viewed as equally good as a source of knowledge. Sometimes the situation is even worse; research findings are regarded as inferior to opinion and precedent. Griffiths reports an experience along these lines. "I was describing the research in pupil-marking and reporting to a group of parents, school administrators, and teachers. As the session proceeded one of the principals became noticeably agitated and finally, unable to restrain himself further, leaped to his feet and said, 'Say, do you believe all this, or is it just research?' "[10]

We have here a vicious circle: (a) many educators do not conceive of the scientific method and research as being of primary significance to their work; (b) this state of mind creates an atmosphere in which low priority is given to the conduct or utilization of research; (c) because of low evaluation and neglect, research continues to be a du-

[10] Griffiths, *Research in Educational Administration: An Appraisal and a Plan*, *op. cit.*, p. 34.

bious enterprise; and (d) because condition (c) exists, condition (a) is perpetuated.

2. Much existing research is low in quality, weak in the insight it imparts, and of dubious utility to the practitioner. Critics have noted a variety of deficiencies, including the following: (a) research has usually avoided crucial problems, focusing instead on topics of minor significance; (b) creativeness has been in short supply, most studies repeating earlier ones in more or less routine fashion; (c) theoretical and conceptual frameworks have been limited, lacking in sophistication, and often unrelated to empirical research; (d) research has been deficient in methodological rigor at all stages in the research process from study design to data analysis; (e) research is not usually cumulative—i.e., the investigator does not build on previous research; and (f) research does not take advantage of the contributions of other disciplines in which relevant work has been done.

3. The nature and functions of "theory" are poorly understood. For many practitioners, the term is a synonym for "wild speculation," an antonym for "practicality." In one survey the urban superintendents of the country were asked to list the outstanding weaknesses of their own programs of graduate study. The one listed most frequently was, "too much theory; courses not practical." Follow-up letters were sent to a sampling of these respondents to find out what they meant by "too theoretical." "The answers to these questions were quite revealing, since they demonstrated many misuses of the word *theory*. Some thought theory was the opposite of practical, thereby equating *theory* with *impractical*. Others had the interesting notion that if a course was *poor*, it was *theoretical* . . . The most common use of the concept theory was as a synonym for *speculation*, *supposition*, or the *ideal*."[11]

4. There is considerable confusion about the relationship between empirical fact and values. This confusion is seen in the often-heard generalization, "Research can find out what exists, but cannot tell you what value choices you should make." At best this is an over-simplification. The fact of the matter is that reliable knowledge can be used to make intelligent value choices possible, to make us aware of the alternatives among which we might choose. For example, we are now beginning to give a great deal of emphasis to the special educational problems of culturally deprived populations. This choice of emphasis is value-laden. We should also recognize, however, that theoretical formulations and empirical research have called this segment of the population to our attention, have identified the reasons for giving special attention to it, and have pointed out the feasibility and utility

[11] Daniel E. Griffiths, "The Nature and Meaning of Theory," in Griffiths (Ed.), *Behavioral Science and Educational Administration, op. cit.*, p. 96.

of specially designed educational programs. Only in this context could value choices be made as they have been.

5. Research on topics important to education cover a wide range; these topics are complex and difficult to investigate. Yet we have no alternative to tackling these problems head-on. We make no progress by dismissing the task as too difficult or hopeless. Only the research approach gives promise for significant and long-lasting improvements in educational programs.

The Contributions of Research

In this vein, the kinds of contributions that research *can* make should be noted. Research can provide us with new knowledge as well as test existing knowledge. It can hold our present assumptions up for scrutiny, giving us evidence concerning their truth or falsity. Research can be used to evaluate policies and practices. It can also be made an integral part of our experimental programs. For research to make these impressive contributions to education, however, requires fundamental changes in the kinds of research done. What *kind* of research is needed?

The Characteristics of Needed Research

A major need is for increased sophistication in the conceptualization, design, and conduct of research. What is termed "research" can vary considerably in rigor and utility. In examining this point, it is instructive to note Lundberg's well-known discussion of levels or methods of scientific procedure.[12] Lundberg identified four of these, the first being *random observation.* This simplest and crudest method of research consists of occasional and somewhat haphazard observations —"exploratory" studies. This method is sometimes called "radical empiricism" or "naked empiricism." It rests on faith that the "facts will speak for themselves," that their meaning will somehow become clear. It has become abundantly clear that this faith is unfounded. This method has its chief utility as a source of ideas for more advanced research.

The second level or method discussed by Lundberg consists of *systematic explorations of broad fields or subjects.* Its chief important difference from random observation is in the precision and care shown in data collection and analysis. This method remains valuable in research areas where existing knowledge is slight or poorly organized.

The *testing of well defined but isolated hypotheses*, either by experiment or statistical methods, is the next level. Here hypotheses are stated explicitly, data are gathered and analyzed to test them, and generalizations are formulated.

In terms of scientific sophistication, the fourth level is the most advanced. It consists of *research directed by systematic and integrated*

[12] George A. Lundberg, *Social Research.* New York: Longmans, Green and Co., 1942, pp. 5-9.

theory. "This method begins with (1) a set of rigorous and unambiguous terms to be used. (2) Next is stated a set of postulates or hypothetical statements and their corollaries (inferences from the postulates) which are tentatively assumed to be true for the purpose of the investigation. (3) Thirdly, theorems are stated as formal propositions which could or should be true if the postulates, the corollaries and the reasoning in the theorems are sound. These theorems are really hypothetical generalizations, which direct the nature of the (4) empirical observations undertaken to test the validity of the entire explicit theoretical structure outlined above."[13]

Lundberg's discussion provides a benchmark for the evaluation of research in education; it makes it possible both to see where we are and the directions in which we should seek to go. Clearly, the lion's share of research remains at the first two levels, with some studies now being attempted at the third. It is also clear that our goal should be to conduct virtually all research at the third and fourth levels eventually.

The Road Ahead

No one should underestimate the difficulty of reaching this goal. In moving in that direction, we must contemplate perhaps decades of struggling. We must not only train substantial numbers of researchers and disseminate research findings widely, but we have an even larger task, that of developing a respect for and sympathetic attitude toward research throughout the armies of educational practitioners. Otherwise, research will be of limited effectiveness. The development of a scientific perspective and a research orientation is the most urgent and important challenge facing those who are responsible for training programs at all levels.

In research training programs, we should banish radical empiricism, making investigations at this level no longer acceptable or respectable. Obviously, we should insist on methodological rigor. But this alone is not enough. Above all, perhaps, we should emphasize the nature and functions of theory in research. It must be reiterated that theory gives meaning to facts (i.e., points to the relationships among facts, to their ordering in a meaningful fashion).

We should also insist that claims to reliable knowledge must be of the sort that are capable of being tested (confirmed or rejected). The day of the unsupported generalization and the confident cliché should be brought to an end. We should be ever-ready to abandon our cherished assumptions and beliefs when evidence points in other directions. This self-corrective attitude has been rightly described as the most important characteristic of science. As Feigl has said, "It is a sign of

[13] *Ibid.*, p. 7.

one's maturity to be able to live with an unfinished world view."[14]

I have tried in this paper to identify what our goals and procedures should be in our search for reliable knowledge. The road ahead is long and arduous. We will not and cannot change our traditional ways of doing things overnight. But we can look forward to the day when our policies, practices, and innovations rest on firmer bases than they do now.

[14] Herbert Feigl, "The Scientific Outlook: Naturalism and Humanism," in Herbert Feigl and May Brodbeck (Eds.), *Readings in the Philosophy of Science*. New York: Appleton-Century-Crofts, Inc., 1953, p. 13.